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Assessment of the Effectiveness of Treatment for Temporomandibular Joint Dysfunctions

Ocena skuteczności terapii zaburzenia układu ruchowego narządu żucia

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A – research concept and design, **B** – collection and/or assembly of data, **C** – data analysis and interpretation, **D** – writing the article, **E** – critical revision of the article, **F** – final approval of article

Abstract

Background. Temporomandibular joint dysfunctions pose a problem in terms of both diagnosis and therapy. This is due to the complex causes of the disease and numerous subjective symptoms that are difficult to assess objectively.
Objectives. The aim of the present study was to assess the effectiveness of therapy in patients with temporomandibular joint dysfunctions.
Material and Methods. The material comprised a group of 43 patients (including 33 women and 10 men), who had a follow-up examination (examination I) minimum 6 months following a first visit (examination 0) when temporomandibular joint dysfunctions were diagnosed and the treatment proposed. Of the 43 persons included in the follow-ups, 86% had undergone the treatment recommended during examination 0 – i.e. a total of 37 persons, including 10 men and 27 women. The examination was carried out using a clinical dysfunction index (Di) and anamnestic questionnaire devised by Helkimo. In addition, during examination I, patients answered questions from the prepared questionnaire.
Results. A statistically significant difference ($p < 0.00$) was noted in the mean values of clinical indicator Di in examination I in relation to the values obtained during examination 0. A total number of 30 patients assessed the treatment they received positively, 3 negatively and 4 of them were not fully satisfied with the obtained results.
Conclusions. The majority of patients assessed the received treatment positively, as was confirmed in the clinical status. More objective instruments for measuring the condition of patients with temporomandibular joint dysfunctions are recommended (**Dent. Med. Probl. 2014, 51, 1, 72–78**).

Key words: temporomandibular joint dysfunctions, treatment outcome, temporomandibular joint disorders therapy.

Streszczenie

Wprowadzenie. Zaburzenia układu ruchowego narządu żucia to problem diagnostyczny i terapeutyczny. Wynika to ze złożonych przyczyn tej choroby oraz z licznych objawów subiektywnych, trudnych do obiektywnej oceny.
Cel pracy. Ocena skuteczności przeprowadzonego postępowania terapeutycznego u pacjentów z zaburzeniem układu ruchowego narządu żucia.
Materiał i metody. Badaniem objęto grupę 43 chorych (w tym 33 kobiety i 10 mężczyzn), którzy zgłosili się do badania kontrolnego (badanie I) po minimum 6 miesiącach od pierwszej wizyty (badanie 0), na której potwierdzono rozpoznanie zaburzeń układu ruchowego narządu żucia i zaproponowano podjęcie leczenia. Wśród 43 osób, które zgłosiły się do badania kontrolnego, zaproponowane podczas badania 0 leczenie podjęło 86% chorych – łącznie 37 osób, w tym 10 mężczyzn i 27 kobiet. Badanie przeprowadzono z zastosowaniem klinicznego i anamnestycznego kwestionariusza według Helkimo oraz opracowanej ankiety (pacjenci udzielali odpowiedzi na pytania zawarte w tej ankiecie podczas badania I).
Wyniki. Uzyskano istotną statystycznie różnicę ($p < 0,00$) w średniej wartości wskaźnika klinicznego Di w badaniu I w stosunku do wartości uzyskanej podczas badania 0. 30 osób oceniło zastosowaną terapię pozytywnie, 3 osoby negatywnie, a 4 pacjentów nie było w pełni zadowolonych z uzyskanych wyników.
Wnioski. Większość pacjentów pozytywnie ocenia przeprowadzone leczenie zaburzeń, co znalazło potwierdzenie

w obrazie klinicznym. Wskazane jest stosowanie bardziej obiektywnych instrumentów pomiaru stanu pacjentów z zaburzeniami czynnościowymi układu ruchu narządu żucia (**Dent. Med. Probl. 2014, 51, 1, 72–78**).

Słowa kluczowe: dysfunkcje stawów skroniowo-żuchwowych, wyniki leczenia, leczenie zaburzeń czynnościowych.

Patients seeking treatment from a dentist, specialist in dental prosthetics, for temporomandibular joint dysfunctions have often earlier sought help from other doctors. This group includes patients troubled by the occasional or permanent occurrence of sounds in the temporomandibular joint region, patients experiencing a sudden restriction of mandibular movement as well as patients with chronic headaches in the temporal or preauricular area [1–3]. Some patients, especially those suffering from headaches, fear they have cancer [4]. Some patients suffer from temporomandibular dysfunctions despite the fact that they possess full dental arches with no cavities and a healthy periodontium [5]. These patients have varying degrees of knowledge of the methods used to treat functional disorders. Any possible therapeutic procedure is preceded by a single, multi-directional anamnesis, a clinical examination broadened to include radiological diagnostics and a diagnosis confirming or excluding the presence of temporomandibular joint disorders. Patients diagnosed with the complication are informed of the causes of their dysfunction, treatment methods (often multi-stage or multi-directional in character), as well as how to prevent parafunctions that cause the disorder [6–9]. Some patients undergo treatment, while in other cases the symptoms subside on their own. Some patients experience the recurrence of the dysfunction, while some do not undergo treatment or cease the treatment after the first stage. The following study was conducted to analyse the reasons for such scenarios, as well as to assess whether the applied treatment was effective.

The aim of the study was to assess the effectiveness of therapeutic procedures for patients with temporomandibular joint dysfunctions.

Material and Methods

The material comprised a group of patients treated at the University Dental Clinic (UKS) in Cracow over a 2-year period and who were diagnosed or confirmed with the disorder and who were advised to undergo the treatment.

The method comprised of questionnaires and a clinical assessment of the patient's temporomandibular joint system during the first visit (examination 0) as well as a minimum of 6 months afterwards (examination I). During the first visit (examination 0), the patient filled in the anamnestic questionnaire (Ai) devised by Helkimo and a dentist carried out a clinical examination based on the Helkimo questionnaire [10–17], assessed tooth loss and occlusal contacts of opposing teeth according to Eichner's classification [12]. The dentist came up with a diagnosis based on Helkimo's clinical questionnaire: Di-0 – no dysfunction syndrome, Di-1 – mild dysfunction (1 to 4 points), Di-2 – moderate dysfunction (5 to 9 points) or Di-3 – severe dysfunction (10 to 25 points). Then, the patient was informed of the specifics of the disorder and advised to undergo treatment. The clinical examination was conducted by the same dentist who was a specialist in dental prosthetics. The next visit took place minimum 6 months after the first one. It was conducted by the same dentist and involved the same diagnostic procedure that was now broadened in order to include a questionnaire filled out by the patient describing the therapeutic procedure proposed and/or already undergone and the patient's subjective assessment of such treatment (Table 1). The comparison was made between the indicators recorded on the day of the follow-up (examination I) with the results obtained during the first examination (examination 0). Between the two visits, patients were under the care of prosthodontists, who treated them in accordance with the results of the first visit (examination 0). The Bioethics Committee of the Jagiellonian University in Cracow approved the study (KBET/28/B/2009) and the procedure was carried out in accordance with the recommendations of the Declaration of Helsinki.

Statistical Analysis

The results of the study were assessed using descriptive statistics. The normality of the distribution of continuous variables was assessed using the visual method and the Kolmogorov-Smirnov test for normality amended by Lillefors. For continuous variables with normal distribution, parametric tests were used. Two groups of dependent variables were compared using the *T* test for dependent samples. The statistical significance was set at $p \leq 0.05$.

Table 1. Questionnaire assessing treatment

1. Did you undergo the recommended treatment?
A) If YES, then: a/ was the treatment you received a single-stage or a multi-stage procedure? I – if it was a single-stage procedure, what was it? – physiotherapy – surgical – prosthetic – orthodontic – other, what kind? …….. II – if it was a multi-stage procedure, what was it? – physiotherapy, prosthetics – orthodontics, prosthetics – physiotherapy, orthodontics, prosthetics – surgery, prosthetics – physiotherapy, surgery, orthodontics, prosthetics – surgery, orthodontics, prosthetics – other, what kind? …….. b/ was the treatment completed? I – if not, why not? ……...…….. II – if yes, have you noticed any improvement in your health?
B) If NO, then: a/ what was the reason? I – lack of motivation II – the pain subsided on its own III – financial reasons IV – far from the place of residence V – other? …….....…..

Results

The material comprised a group of 43 patients who received treatment at UKS in Cracow, including 33 women and 10 men aged between 14 and 66 and with the average age of 36. Table 2 presents the results of the patients' own subjective feelings regarding symptoms of dysfunction in examination 0 and examination I according to Helkimo's anamnestic questionnaire (Ai). Diagnosis based on clinical examination using Helkimo's clinical indicator is presented in Table 3. Diagram 1 provides a graphic description, in percentage terms, of the patients' clinical condition based on Helkimo questionnaire (Di) during examinations 0 and I. A statistical analysis of the mean Di values shows

Table 2. Results of Helkimo's anamnestic questionnaire

	Examination 0	Examination 1
Ai-0 – No subjective complaints in terms of temporomandibular joint dysfunction, i.e. no symptoms mentioned in the points below.	0	4
Ai-I – Mild subjective symptoms, such as clicking, popping or crepitus in the temporomandibular joint region, a feeling of stiffness or tiredness in the muscles of mastication.	18	28
Ai-II – Major subjective symptoms of temporomandibular joint dysfunction, such as: difficulty in opening mouth widely, lockjaw, pain during movement, pain in the facial and maxillary area, dislocation of joints.	25	11
Number of patients examined	43	43

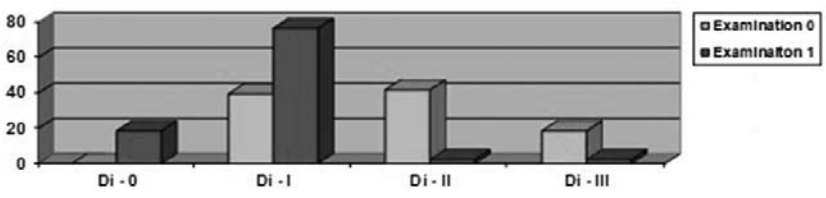

Fig. 1. A graphic description of the percentage values of the Di clinical indicator during examinations 0 and 1

Table 3. Results of clinical examination using the Helkimo index during examinations 0 and 1

	Examination 0	Examination 1
Di-0 No clinical symptoms	0	8
Di-1 Mild dysfunction	17	33 (25 of whom had 1 symptom)
Di-2 Average dysfunction	18	1
Di-3 Severe dysfunction	8	1

Table 4. Correlation results between mean Helkimo clinical indices (Di) in both examinations (*T* test).

Examination 0 vs. examination 1	Number of examined patients	Mean Di of examination 0	Mean Di of examination 1	Standard deviation of examination 0	Standard deviation of examination 1	p
Di	43	5.88	1.7	4.41	3.21	0.000

a decline in examination I in relation to examination 0 from 5.8 to 1.7, and this difference is highly significant statistically ($p < 0.00$) (Table 4).

Types of tooth loss noted in examinations 0 and I are contained in Table 5. During the preliminary examination (examination 0), complete dental arches were noted in 14 patients (group A-1), single tooth loss in 19 (group A-2 and A-3), according to the Eichner scale occlusal contacts in both sides of dental arches in 33 persons (whole groups A), missing teeth in the support zone in 8 persons (groups B), loss of occlusal tooth contacts in 1 case (group C-1 or C-2) and edentulism in both dental arches in 1 patient. The follow-up examination (examination I) once again revealed complete dental arches in 14 patients, but group A in 31, missing teeth in posterior support zones in 11 persons (groups B and C-1 and C-2) and edentulism in 1 patient.

During examination I, patients filling out the questionnaire (Table 1) where asked whether or not they had decided to undergo the proposed treatment. Of 43 persons who appeared for the follow-up, 86% had undergone the treatment proposed during examination 0, i.e. a total number of 37 persons, including 10 men and 27 women (Table 6). A total number of 6 persons from the test group, i.e. 14% of the patients, opted not to undergo treatment. All of these were women. In this group, 1 female patient reported that the pain had subsided on its own, while another decided only to undergo surgery (because she had been recommended for further treatment that she chose not to continue with, she was included among those who opted not to have treatment), and declined to undergo further recommended treatment for financial reasons. This explanation was also given by other 4 female patients as the reason why they had withdrawn from the treatment.

A total number of 37 patients underwent treatment, 30 of whom assessed the treatment positively and 3 negatively. The other 4 patients were not fully satisfied with the results obtained.

Of the 37 patients who decided to undergo treatment a total of 17 received only prosthetic treatment. A further 2 patients underwent surgical treatment, consisting in the extraction of all third molars. A total of 10 patients were treated with physiotherapy. Of this total 3 patients received physiotherapy as their only form of treatment, while 7 others combined it with surgical and prosthetic treatment. A total of 5 patients were treated solely with surgical and prosthetic methods while 3 underwent prosthodontic treatment followed by orthodontic treatment. The percentage distribution of single-stage treatment for men and women is presented in Fig. 2.

The treatment based on prosthetic methods involved making new removable complete dentures for 1 patient, while another 2 patients were fitted with removable dentures after earlier being treated with a stabilization splint made with hard acrylic resin for the mandibular arch, according to the procedure by Ferrario and Sforza [13], 2 patients underwent surgery prior to their dentures being replaced. Another 3 patients were fitted with

Table 5. Results of assessments of occlusal contacts in examined patients

Eichner classification	Examination 0		Examination 1	
	N	%	N	%
A-1	14	33	14	33
A-2, A-3	19	44	17	40
B-1, B-2, B-3, B-4	8	19	10	23
C-1, C-2	1	2	1	2
C-3	1	2	1	2
Total	43	100	43	100

Table 6. A quantitative comparison of the questionnaire results regarding whether or not patients underwent the recommended therapeutic procedure

Underwent treatment:	Men		Women		Total	
	N	%	N	%	N	%
Yes	10	100	27	82	37	86
No	0	0	6	18	6	14
Total	10	23	33	77	43	100

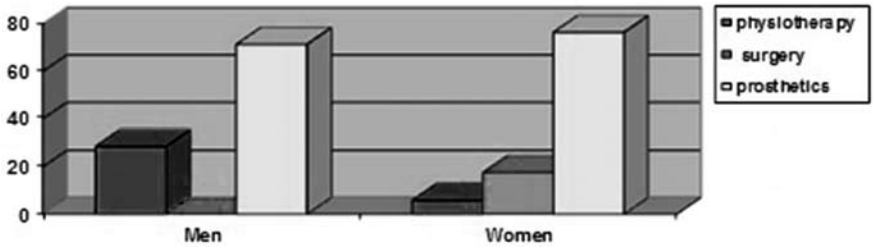

Fig. 2. Percentage distribution of single-stage treatment for men and women

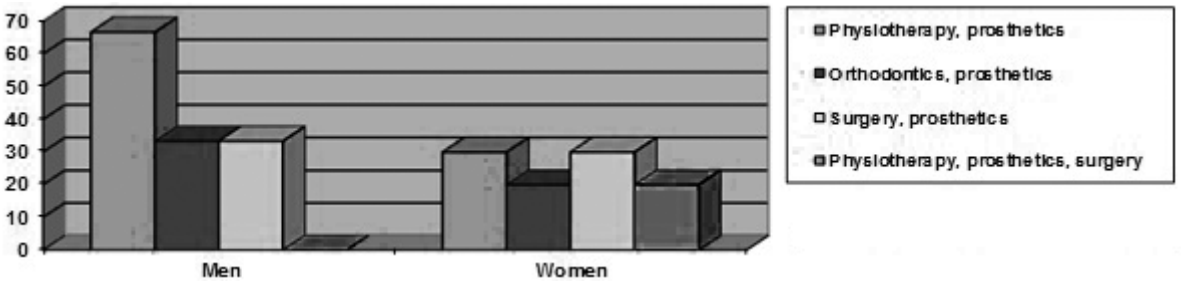

Fig. 3. Percentage distribution of multi-stage therapeutic procedures undergone by men and women

a repositioning splint designed with accordance of Robertson et al. [14], which was then replaced with a stabilization splint in 2 cases. 13 patients were fitted with a stabilization splint, 3 of whom first used an immediate silicone splint. Two patients received treatment in the form of a sublingual plate designed by Włoch [15] and 2 other patients were fitted with an NTI splint. In 8 cases prosthodontic treatment was limited to the use of an immediate silicone splint, 1 of whom continued to receive orthodontic treatment while another underwent physiotherapy and another had surgery. The percentage distribution of multi-stage therapeutic procedures undergone by men and women is presented in Fig. 3.

The study made use of the Helkimo index, which consists of both anamnestic and clinical parts (Table 2 and 3). In the preliminary examination (examination 0) a total of 18 patients reported "mild symptoms…" (Ai-I) prior to treatment, 9 of whom were diagnosed with 1 clinical symptom (12 patients from this group were diagnosed with mild dysfunctions), 5 patients had average dysfunctions and 1 had a severe dysfunction. A total of 25 patients reported "major symptoms…" (Ai-II) during examination 0, while in the clinical examination 5 patients from this group were diagnosed with mild dysfunctions, 13 with average dysfunctions and 7 with severe dysfunctions.

It should be pointed out that in the case of 8 patients no clinical symptoms were observed in the follow-up (examination I) that would have indicated the presence of dysfunctions, while only 4 patients reported their condition as good and as with no symptoms of dysfunction. The other 4 patients reported in anamnestic scale experiencing "mild subjective symptoms…." (Ai-I), which was not confirmed in the clinical examination. A total number of 28 patients in the follow-up reported having "mild…." symptoms (Ai-I), 21 of whom had only one clinically diagnosed symptom of dysfunction. Among patients who reported experiencing "major symptoms...." (Ai-II) (there were 11 such persons in examination I) 4 were clinically diagnosed with one symptom, another 2 had 2 symptoms of dysfunction (a total of 9 patients from this group were diagnosed with mild dysfunctions), 1 patient was diagnosed with an average dysfunction and 1 with a severe dysfunction.

Discussion

The differences in the clinical diagnostic results of patients between examination 0 and examination I expressed as the average value of the Di indicator are statistically significant, which confirms the clinical effectiveness of the treatment. The disparities between the anamnestic and clinical results of patients may indicate imperfections in the questionnaire, especially in the anamnestic part, where no distinction is made between the scale of the pain and its frequency as well is in the number of symptoms, for example joint sounds (periodically, only with border movements, while chewing solids, during all mandibular movements, etc.). At the same time, the results of the questionnaire and clinical examination show an improvement in the patients' condition, which is reflected in the numerical values.

Of those patients who assessed their treatment negatively (3 persons) the disorder was observed to have worsened in 2 cases. One of those patients diagnosed during the follow-up (examination I) with average dysfunction, i.e. Di- II and with complete dental arches, was fitted with a repositioning splint and then with a stabilization splint. The patient currently requires further treatment. The second patient was diagnosed in examination I with a severe dysfunction, i.e. Di-III with loss of one occlusal support zone, had hither to undergone physiotherapy and been fitted with a silicon splint. The patient requires further treatment with an occlusal splint and restoration of missing teeth. In the next case, no symptoms of clinical dysfunction were diagnosed during the clinical examination (examination I) of patients who were dissatisfied with the course and effect of their treatment, and one patient reported experiencing "no subjective complications", i.e. Ai-0, based on the anamnestic indicator. This patient uses a stabilization splint due to pathological abrasion, but has decided not to undergo permanent restoration of the occlusal surface of teeth (and thus assesses the treatment negatively). Pathological dental abrasion, which is included as a symptom of excessive masseter muscle activity and/or central input, defined as a symptom of temporomandibular joint dysfunction, is not shown in clinical examinations based on the Helkimo index. Similarly, of the 4 other patients not fully satisfied with their treatment outcome, 1 possessed complete dental arches and suffered from pathological abrasion, the state of which cannot be defined using the Helkimo index. To obtain a full picture of the condition of patients, it would thus appear reasonable to use in addition an instrument that would assess the degree of abrasion of hard dental tissue.

Both complete dental arches and varying degrees of tooth loss, including complete edentulism were observed in the patients analysed in the study. The state of the patients' teeth during the assessed period did not change significantly. This may indicate that the occurrence of temporomandibular joint dysfunctions may negligibly depend on the type of tooth loss involved, a fact which has been confirmed in the studies of other authors [5, 17].

An analysis of the treatment outcomes revealed a distinct increase in the number of patients who reported experiencing joint sounds effects during their follow-ups, as was confirmed by the clinical examination. This indicates how difficult it is to eliminate this pathological condition, as has been observed by other authors [5, 18–20]. Simultaneously, the treatment applied was effective in reducing the pain experienced by the patients, which is regarded as the most important goal of the therapeutic procedure [21]. Described methods of treatment used in that group of patients varied very much. It was a limitation of that study and made impossible to compare treatment effectiveness of each devices. But they are described as effective by numerous authors [21–24]. The treatment methods recommended in that group of patients, needs to be analysed in randomised control prospective study [25]. The main purpose of all of presented treatment was to receive as ideal as possible occlusion to have functional stability of both temporomandibular joints and masticatory muscles which reduced the patients complains.

The authors concluded that the majority of patients assessed the received treatment positively, as was confirmed in the clinical status. More objective instruments are recommended to measure the condition of patients with temporomandibular joint disorder.

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